Name _____

NASA/Tropical Rainfall Measuring Mission (TRMM)
Topic #4: Lightning
Activity #3: Interpretation of Satellite Lightning Images

OBJECTIVE: To interpret the images produced by the Lightning Image Sensor which is one of the instruments aboard the TRMM satellite.

WHAT'S HAPPENING?
The Lightning Image Sensor (LIS) aboard the TRMM satellite enables scientists to better understand the relationship between lightning and storm activity. During several severe storms over Florida, it showed lightning flashes increasing, then decreasing. Minutes later, the area was struck by a tornado. Bursts of inter-cloud lightning occur as updrafts (rising air) strengthens. There seems to be a connection between increasing bursts of lightning and severe weather such as hail and tornadoes. From the vantage point of the TRMM satellite orbiting at 218 miles above the Earth, the LIS solid-state camera can see a lightning flash which occurs day or night, cloud to ground, or within the cloud. It records the time of lightning event, the brightness of the flash and its estimated location. The satellite allows the sensor to view a point on Earth for 80 seconds, a sufficient time to estimate the flashing rate, which tells researchers whether a storm is strengthening or weakening. One major finding has been that 90% of the lightning strikes over land. Scientists believe that this may be a result of stronger convection currents which are set in motion as warm air rises over the hot sunlit land.

MATERIALS: (per student)
Computer with Internet access to < http://thunder.msfc.nasa.gov/ >
(NOTE: If individual students do not have on line access, make the images into transparencies or color copies and use *Interpretation* questions #1 to # 10.

PROCEDURE:
1. Enter the address< http://thunder.msfc.nasa.gov/ >
2. Select "Dataset Information"
3. Cursor down and click on " Search online Lightning Data observed by LIS"
4. Place the pointer finger on "Florida" and click.
5. In the section *Select Time*, choose "1998 – June"
6. Cursor to the bottom click on "Submit"

INTERPRETATION
1. At the bottom of the data chart, how many total flashes are shown? _____
2. Cursor down to the map. Based on the key, what color indicates > 50? _____
3. What are the values assigned to green? _____ To purple? _____
4. In general, are there more lightning strikes over land or water? _____
5. Describe the location of the storm with the high intensity of red.
   _____

6. Cursor up to the data chart. Go the far right column. What is the highest number of flashes listed for a given time period? _____

7. Use the "back" feature at the top of the screen to return to the page to *Select Time*. Click on June 1998 to delete this choice and select "1998 – December". Click on "Submit". At the bottom of the data chart, what is the total number of lightning strikes shown in this image? _____

8. How does the number of lightning strikes in December 1998 compare to June 1998? _____

9. Consider the difference in seasons. If hot rising air causes thunderstorms, explain why there are fewer storms in December._____

10. What is the latitude (numbers on left side of map) and the longitude of (bottom of map) for the southern tip of mainland Florida? Latitude: _____N , Longitude: _____ W

11. Go to the top of the page and select "Bookshelf" from the menu bar. Under *NewItems* select "Lightning likes land – 5\19\98". What percentage of lightning was over land? _____

12. According to Dr. Christian, why is there more lightning over land? _____

13. Go to the gray box entitled *related links*. Click on "Lightning detectors watch storms that spawned tornadoes (April 2,1998)". How is lightning generated in a storm?

_____

14. What is the total number of people who died in Georgia and Florida? _____

15. Note the graph of the OTD (Optical Transient Detector). Note the lightning activity as the storm progressed is listed in bars from left to right. Describe the trend in the number of lightning strikes before the tornado occurred.

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